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HEAT ENGINE LABORATORY PRACTICE.

The Testing of Motive-Power Engines, including Steam Engines and Turbines, Locomotives, Boilers, Condensers, Internal Combustion Engines, Gas Producers, Refrigerators, Air Compressors, Fans, Pumps, &c. By R. Royds. Pp. xii + 396. (London: Longmans, Green, and Co., 1911.) Price 9*s.* net.

DURING the last decade the training of engineering students has undergone a great change. Our colleges have recognised that the engineering laboratory is not only a place where the student may see various principles previously expounded in the lecture-room put into practice and experimentally proved, but that it is a place where tests and trials are carried out upon a commercial basis and in an up-to-date manner by the student himself. If the student be put in direct charge of such tests, he will most assuredly develop that faculty of self-reliance which is one of the characteristics of a successful engineer. Side by side with this internal development there has been a vast change in the design and nature of motive-power engines, so that the modern laboratory has developed into an assembly of many varied types of prime movers. In acquiring information which will enable him successfully to cope with the different practical difficulties met with amongst so many types, the student had to refer to many sources, the chief being the recent publications of the technical societies and Press. This book does that for them, and does it very thoroughly. It meets a distinct want, and at such a reasonable price it should be recommended to all college students.

After giving it a welcome, we hope the author will not take it amiss if we indulge in complaint. Chapter i. treats of general principles of thermodynamics, units, and cycles of operation. On p. 6 the author states that the centigrade scale of temperature measurement is used by some engineers, but more often by physicists and chemists. We believe we should be correct in saying all men of science save some, mostly engineers, use the centigrade scale. Why do not engineers come into line? If the author would have bravely adopted Cent. instead of Fahrenheit, he would have aided in bringing about a change which is slowly coming to pass. This leads us to suggest he might have included the pound-calorie in his enumeration of units of heat, a unit recognised by the University of London in their engineering examinations. Surely also it is more reasonable to expect the conversion of Fah. to Cent. readings to be made by subtracting 32, then multiply by $\frac{5}{9}$, than to remember the suggestion on p. 6, for which no reason is given. At the end of the book there is a series of tables, including conversion constants, properties of various vapours, and steam tables. We note that the latter are from "Marks and Davis." We were hoping that when the last edition of Prof. Ewing's book, "The Steam Engine," was produced, the researches of Prof. Callendar were going to be recognised by English engineers. In an appendix to his book Prof. Ewing gives some properties of steam, and tables, which are certainly more rational in form than any others compiled from data outside Prof. Callendar's papers. We hope that in his next edition the author will introduce the pound-calorie unit and a short explanation of Callendar's work in his chapter i., together with steam tables compiled therefrom, and thus associate himself with Prof. Ewing and Dr. Mollier in bringing about a desirable change. The explanations of the various cycles of operations of the working fluid are well given, and in conjunction with lectures will make an excellent combination for the earnest student.

The testing for accuracy of instruments such as gauges, indicators, &c., makes a long chapter for No. ii. This is good, as many are unduly predisposed to accept such as correct instead of always regarding them with suspicion. We should like to see a device for testing indicator springs hot, the methods shown being all under conditions dissimilar to their actual working state. Does the author use an indicator cock and connect an indicator to a dead-weight gauge tester, as shown in Fig 34? The fluid pressure will more nearly reproduce actual working conditions. Carefully and well written as chapter ii. is, the author is best in chapter iii., on measurement of brake horsepower. We are glad to see a description of a band brake which will give torque without causing a bending action due to large brake loads on one side.

Chapter iv. is outside the scope of English laboratory work. The testing of locomotives is in the hands of a few, and those highly skilled, and therefore needs not a general treatment as is here given, but a special treatise. Is it too much to hope that soon we may have in such a city as London an experimental plant for locomotive testing? It would surely prove of great use even if only for training up stokers at short notice. Chapters v., vi., and vii. are concerned with the testing of steam engines, turbines, and boilers. We are glad to see so much of the report of the Institution of Civil Engineers, vol. cl., embodied in these chapters. The author deals carefully with the "missing quantity" of steam as passed by the

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engine, and the pages dealing with leakage to exhaust are very good.

The testing of internal combustion engines is an up-to-date review of work which is being done by the British Association Committee, and also includes gas producers, the Diesel type, &c. The chapter on refrigeration tests is helpful, but, as the author would probably admit, it is very difficult to get all the conditions steady enough to make the tests as satisfactory as could be wished. The testing of water-turbines and pumps complete the book, which is the more valuable for a carefully compiled index at the end. As we stated above, it is a book which is needed, and we can heartily recommend every student to place it on his work-desk. It is comprehensive, but it deals very thoroughly with the most general types of engines and boilers. The illustrations are good and plentiful, and we conclude by congratulating the author on producing such a practical treatise.

A. J. M.

GROWING OUR OWN SUGAR.

Sugar Beet: Some Facts and Some Illusions. A Study in Rural Therapeutics. By "Home Counties" (J. W. Robertson-Scott). Pp. xx. + 424. (London: Horace Cox, "Field" Office, 1911.) 6*s*. net.

THIS work is based largely upon articles published in *The Field* and *The Times* during the years 1910–11, and is essentially an examination of the arguments for and against the proposals to establish a beet sugar industry in this country. "There are those," the author remarks, "who hail sugar beet as the saviour of the countryside; and there are those who are sure that the notion of growing our own sugar at a profit is preposterous." For each of these classes he has collected a large number of "facts," and to some of the former he indicates what in his judgment are "illusions."

That sugar beets can be grown here, and of as good quality as on the Continent, hardly needed demonstration. What did require investigation was whether, in all the circumstances, it was worth our while to do it.

The author examines this question step by step. He describes the chief experiments that have been made in this country, from the Lavenham venture some forty years ago to the East Anglian trials made under Dutch auspices in 1910. In these trials, it may be mentioned, more than three hundred acres were planted with beet intended for exportation to Holland, and the quantity registered as actually exported was 3909 tons. This weight, however, is untrustworthy, as it includes a large proportion of adherent soil. The factory purchasing the roots pays upon the weight of the cleaned beets only; and heavy deductions had to be made from what the farmers supposed to be the weight of their crops. Probably one of the "illusions" indicated in the title arose from calculations based upon a crop yield which, for the reason mentioned, might be over-estimated as much as 10 to 50 per cent. Whilst average crops of more than 20 tons per acre have been talked about in this country, the cold fact remains that on the Continent in 1910 the average yield ranged from 9·3 tons in France to 13·3 tons in Germany.

For various reasons the East Anglian experiments were only moderately successful. The causes of this are indicated; and the author compares the results of these and other English efforts with the teachings of practical experience abroad. He quotes numerous reports, and generally gives chapter and verse for his carefully guarded conclusions. These are, briefly, that a cooperative factory, growing its own beets, or a large proportion of them, would have the best chance of success; but that an ordinary factory, established after careful investigation, under good management, and with proper support from farmers in the vicinity, would have fair prospects; also that the introduction of the beet sugar industry would help in bringing about in rural England changes of some value agriculturally and sociologically, and is deserving therefore of sympathetic study. Owing, however, to the developed condition of our agriculture, and also to the increasing competition of cane sugar, the benefit in England would not be likely to equal that obtained on the Continent.

Of purely scientific interest there is very little in this "study in rural therapeutics"; but from the agricultural point of view it ought to do a good deal towards clearing away misconceptions.

C. S.

COLLOIDS IN INDUSTRY

Die Bedeutung der Kolloide für die Technik. Allgemein verständlich dargestellt von Prof. Kurt Arndt. Zweite Auflage. Pp. 46. (Dresden: Theodor Steinkopff, 1911.) Price mk. 1.50.

ALTHOUGH it is fifty years since the distinction between colloids and crystalloids was first drawn by Thomas Graham, it is only quite recently that the conception of colloid substances has been extended beyond the ranks of a few specialists to possess some meaning for the public at large. Almost as recent and remarkable in its suddenness has been the feverish eagerness with which the properties and behaviour of colloids have been investigated. In Germany, there are several journals devoted entirely to colloid chemistry, as well as text-books of every variety.

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